

Using Concepts of Driver Expectancy, Positive Guidance and Consistency for Improved Operation and Safety

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Kansas State University has had a Traffic Assistance Services for Kansas (TASK) for several years to develop and present training materials to local government personnel with the objective of improving safety. The authors have promoted the concepts of driver expectancy and positive guidance in all of their materials. For example, these concepts are the foundations of the Kansas Low Volume Roads (LVR) Handbook. As a companion to the handbook, Commentary Driving was developed as a tool for evaluating LVR situations where roadway conditions and/or signing "surprised the driver," i.e. violated the drivers' expectancy. These are potentially high-risk locations. Commentary Driving is a technique where a driver drives a route while he/she makes a running commentary of his expectations and particularly his/her expectancy of the road ahead and his/her driving requirements to drive safely. Kansas State University (KSU) developed a number of manuals and course materials over the years to teach the technique. The training progressed from subjects driving vans over specified routes to having subjects view videos. The final step was to develop a commercial production of a self taught interactive video/workbook. With this media it is possible to teach and promote the technique worldwide. The paper discusses the importance of the technique to improved safety on LVR and its potential or a low-cost, valuable tool around which a local unit of government could build a local safety management system (SMS). Key words: driver expectancy, commentary driving, positive guidance.

INTRODUCTION

Roads should be inspected to note if existing signing is adequate and if signs are the proper size, shape and color. State and local governments must also ensure that the appropriate sign or marker is used properly and consistently to give drivers clear information when and where needed. Commentary driving is a procedure developed to assist in evaluating roads and achieving proper, consistent signing at a reasonable cost. The procedure can benefit local governments in defense against tort liability claims and in meeting increasingly tighter budgets because, when used, commentary driving also cuts down on over-signing. It is based on the human factors principles discussed below.

BASIC PRINCIPLES OF SAFE OPERATING PRACTICE

Three basic principles of human factors that relate to safe operating practices on highways are "driver expectancy," "positive guidance" and "consistency."

Driver Expectancy

Drivers, and people in general, expect things to operate in certain ways. When a driver's expectancy is incorrect, either the driver takes longer to respond properly or he/she may respond poorly or wrongly. If, for example, a driver relies on a curve sign that shows a curve to the right but the road actually curves left, one can imagine the difficulty the driver may have in safely negotiating the curve—especially if he/she is a stranger to the area at night. This has been observed rather frequently in the "Winding Road Sign" in which the bottom or beginning curve points in the wrong direction.

What the driver expects on a road is greatly influenced by the "roadway environment," i.e., what was experienced on the previous section of the road. Studies have shown that what a driver experiences on a road section—presence or absence of traffic control devices, road surface type, condition and width, narrow bridges or culverts, is what the driver expects to continue for the next 1 to 2 kilometers.

Driver expectancy is also affected by those things drivers have learned through past experiences. Driver expectancies are affected by the type of road, such as an interstate highway, state highway, county or township road. The prudent driver expects to drive each of these with different levels of caution.

Positive Guidance

Positive guidance is the concept that a driver can be given sufficient information where he/she needs it and in a form he/she can best use it to safely avoid a hazard. Positive guidance can be given to the driver through a combination of signs, object markers, safe advisory speed signs, and probably most important of all, the view of the road ahead. A prudent driver with adequate view of the road ahead will adjust his/her driving tactics accordingly. This is particularly true if the driver is provided with consistent alignment, adequate sight distance and adequate and consistent signing. If drivers could see the curves far enough ahead to judge their sharpness and adjust to a safe speed, or see approaching cars on cross roads because the intersections were clear of sight obstructions, or

if there were no intersections hidden by the crest of a hill, and if all narrow bridges and culverts were visible to drivers from both directions, the road “communicates well.” Under these conditions there would be little need for anything more than an occasional stop or yield sign to assign the right of way at the intersection of LVR roads with higher volume roads. The condition just described might be called “roadway positive guidance.” Using the edge of roadway to guide traffic provides an easy and effective way of providing positive guidance at narrow bridges and culverts or other roadside obstacles.

Consistency

Consistency relates to the “sameness” of the nature of the road from one section to another. Inconsistencies are sudden changes in the nature of the road, e.g., a sharp curve after a long, straight section. Inconsistencies violate a driver’s expectancy; thus either the road should be made consistent, which may be impractical, or something should be done to change the driver’s expectancy. For example, in the case of a hidden curve in a nearly straight roadway, the use of a curve warning sign with an advisory speed plate will correctly change the driver’s expectancy.

Some inconsistencies are obvious; others are more subtle, but no less dangerous. A very useful tool to find and correct such inconsistencies, information deficient locations and locations where drivers’ expectancies are violated is Commentary Driving.

The driver brings a body of knowledge, experience, and skills to the driving task. This *a priori* information is supplemented by the information acquired in preparation for a specific trip. Primacy, expectancy, positive guidance, consistency and *a priori* knowledge affect and are affected by the manner in which the driving task is performed, and how the driver interacts with the roadway environment in which he/she operates. The Commentary Driving procedure can be used to evaluate this interaction.

HISTORY OF THE PROCEDURE

The Commentary Driving procedure was first developed in 1985 and was known as the Simplified Location of Information Deficiencies (SLIDE) procedure (1). In 1988 a joint Kansas University and Kansas State University (KSU) Traffic Assistance Services for Kansas (TASK) project team modified the SLIDE procedure for use on Low-Volume Roads (LVR) and published a manual on commentary driving (2).

OVERVIEW OF THE PROCEDURE

Commentary driving is a procedure in which the roadway is driven and the driver comments on areas that present confusing situations that could be potential hazards. It is most effective if the driver is not familiar with the roads being driven. During the first kilometer or two, the driver/evaluator should form his or her own “expectancies” for the roadway. For example, if the road is wide, straight and smooth for a kilometer or more, we expect it to generally continue that way—that is our *expectation*. If, as we go over the crest of a hill, the road curves sharply, without warning, we are surprised, and thus, our expectancy has been “violated.” This is the typical

reaction of an average driver. As the driver proceeds down a road, each area where his/her expectancy is violated represents a problem area, i.e., a potential hazard that increases crash risk.

Comments are usually recorded on an audio cassette or videotape recorder to record the location and type of potential problem for more detailed study at a later time. The location is easily noted by an odometer reading. It is stressed that the commentary driving procedure is to “flag” potentially high-risk locations for further study. At these locations, a detailed study should be conducted at a later time to determine if changes are really needed. IDE checklists are described and discussed in more detail below.

USING THE PROCEDURE

A vehicle and one or two persons are needed to drive and follow the procedure. One person is the driver/commentator and the other is the recorder/navigator. This allows the driver/evaluator to focus attention on roadway deficiencies and not the procedure itself.

The driver is the key to commentary driving. The driver will locate problem locations by observations of the environment, the roadway ahead, signs and markings. It works best with a driver who is unfamiliar with the road and is forced to rely more on information given by signs or the roadway itself.

Procedure

The actual procedure of commentary driving involves three basic steps:

Step 1: Select an Appropriate Route

As stated, the commentary driving technique works well on low volume roads, i.e. roads with traffic volume less than 400 vehicles per day. A common length of roadway section for the commentary driving procedure is 5 to 24 kilometers. The length must be long enough to allow the evaluator to form initial “expectancies” of the roadway, but not too long so the evaluator becomes tired and less observant.

Step 2: Drive the Route and Record Verbal Comments

First, initial expectancies of roadway conditions are stated. Second, verbal comments are made while driving the roadway to indicate expectancy violations. When driver expectancies are violated on a roadway, an information deficiency and potentially dangerous situation may exist. While following the commentary driving procedure, expectancies should be stated initially and periodically throughout the procedure.

Roadway conditions which form driver expectancies include roadway alignment, width, shoulders, surface texture and/or signs and markings. Factors that affect information needs of drivers include:

- Consistency—the “sameness” of the road, e.g., straight or winding, etc.
- Positive Guidance—sufficient information to avoid hazardous situations, e.g., obstruction markers, arrows or tapering

- Uncertainty—confusing or insufficient information, e.g., the road “disappears” over a hill with no indication if it continues straight or curves
- Decision Sight Distance—distance required to see and react to a situation in time to avoid a problem.

The driver’s comments should concentrate on:

- missing information
- incomplete information
- inappropriate message
- misleading/confusing information
- inappropriate location
- inconsistent information, and/or
- signs obstructed by weeds, brush, etc.

Specific commentary should contain information about the road type and texture, travel direction, curve sharpness, bridge width, right of way at intersections, and other roadway conditions. An audio cassette or video-tape recorder is suggested as a recording device. A hypothetical example of suggested commentary might be as follows when approaching a crest:

“Crest curve ahead, view of road limited . . . tree line indicates that road goes straight ahead . . . not concerned about on-coming traffic . . . wide enough pavement . . . can maintain cruising speed . . .”

Once the driver gets to the crest and sees (or reacts) to what is there, just over the crest, there may be two possible comments depending on conditions relative to his expectations when approaching the crest. Assuming two different situations are possible, the corresponding comments could be:

Situation 1: “the road goes straight as expected” (continue with comments on next section), or

Situation 2: “Hey! Tree line went straight but road turned left sharply . . . “Expectations” violated . . . needed to reduce speed . . . should have had curve warning sign at least . . . possibly speed advisory . . . mark site for study.” (Sites are usually “marked” by recording odometer numbers.)

When the driver/evaluator discovers a situation where an information deficiency exists, an appropriate comment should be made. Either the driver or passenger can then record the location by the odometer reading (or other means) and a brief description of the situation to note the location and deficiency for a more detailed study at a later time. Odometer readings can be used later to tie the commentary to specific locations and should be recorded frequently.

Step 3: Detailed Study of Problem Sites

It must be emphasized that commentary driving is not intended to be a complete evaluation technique. *Properly used, it is a technique to flag potential problem sites for later evaluation.* More detailed valuations should be conducted at locations where violations of expectancy or any problems were noted during step 2. It could be that an evaluation shows that there is no problem. This should be documented and filed. The driver/evaluator may choose to conduct the in-depth study shortly after doing the commentary driving, or at a later date, according to priorities.

To make the detailed analysis easier, particularly for local organizations with little or no technical expertise in road safety problems, KSU developed checklists for nine different common deficiency situations, with a tenth for all other or general cases (3).

For each of the nine situations there are specific questions which are structured to lead the investigator through a systematic evaluation of the site. The check sheets may be modified to meet specific location and local jurisdictional needs. Each checklist provides a checklist of suggested treatments appropriate to the situation being investigated. This may also be modified to local standards and/or guidelines. An agency with established policies on road safety should use its own guidelines for the detailed study of potential problem locations.

Suggested Program

It is suggested that all roads in a jurisdiction be driven on a regular basis so that every road is driven on a one or two year rotational basis. Once the initial commentary driving procedure is completed and problems are corrected, the procedure can be done quickly, as only a few problem areas will be found. When major changes have been made to a road, it should always be redriven, preferably by a driver not familiar with the changes that were made.

TEACHING THE TECHNIQUE

The author and predecessors have held short courses and workshops based on the LVR Handbook to teach the techniques (2,3,4). In the early workshops, participants drove university vehicles over low-volume routes in surrounding counties. All routes had been previously selected and evaluated by course instructors and were clearly marked on county maps.

An idea was born to put the entire workshop into a self-taught video and interactive instruction manual. This project was started in the fall of 1991 and completed in the summer of 1993. Details of the video and instruction manual are contained in the video and accompanying manual, “Instruction Manual for Commentary Driving: A Self-Taught Interactive Video/Workbook” (5). To present full details here would be too lengthy. In addition to teaching commentary driving, the video also teaches good signing principles.

CONCLUSIONS AND RECOMMENDATIONS FOR USING COMMENTARY DRIVING

Conclusions

Commentary driving is a very useful technique for highway personnel to use in the everyday safety evaluation of roads and streets in their jurisdiction or of specific projects on their roads and streets. The author believes it is the most cost-effective technique available to evaluate the safety of low-volume roads. The commentary driving procedure pinpoints high risk locations and situations—before crashes occur. In this regard, and where accident data is scarce, the commentary driving technique has many advantages over high accident location techniques. The author believes that it could be adapted to other classes of roads and streets, such as construction work zone sites or sites with complex traffic patterns.

The commentary driving procedure should be included as a part of any local road safety audit or safety management system.

The commentary driving technique is more effective if the driver/commentor is someone not too familiar with the route or section, e.g., engineers from adjacent jurisdictions could drive each other's roads.

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